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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/598,124

08/18/2006

Isao Sakamoto

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EXAMINER

TAKEUCHI, YOSHITOSHI

ART UNIT

PAPER NUMBER

4162

NOTIFICATION DATE

DELIVERY MODE

08/14/2008

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/598,124	Applicant(s) SAKAMOTO ET AL.	
	Examiner YOSHITOSHI TAKEUCHI	Art Unit 4162	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 August 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 August 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>27 Nov 2006</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 1 is rejected because it recites the limitation "the melting point" in the second paragraph. There is insufficient antecedent basis for this limitation in the claim.

3. Claim 1 is rejected because the phrase, "liquid substance contains a flux component whose reaction temperature is close to the melting point of the solder particle" is indefinite. A claim may be rendered indefinite by reference to an object that is variable. See ex parte Brummer, 12 USPQ2d 1653 (Bd. Pat. App. & Inter. 1989) (a claim for the spacing between bicycle tires to be proportionate to the rider's height was held to be indefinite because the build of the rider was not specified). Appropriate correction is required.

4. Claim 1 is rejected because the term "normal temperature" is indefinite. Appropriate correction without adding new matter is required.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1 and 3-16 are rejected under 35 U.S.C. 102(b) as being anticipated by Saito et al (PCT/JP02/09946, with specific references made through the national stage publication of US 2004/02509129). Saito teaches a solder flux composition (abstract) for use in electronic components (paragraph 0002) and a method of soldering using the same, wherein the liquid substance contains a flux component (abstract) and a tin alloy (paragraph 0111, where the solder powder may be of any kind, including Sn/Pb, Sn/Ag, Sn/Ag/Cu, Sn/Cu, Sn/Zn, Sn/Zn/Bi, Sn/Bi, or Sn/In, which is similar to the solder powder composition described in the Specification, page 9, line 10), where the flux reaction temperature is close to the melting point of the solder particle (Table 1, where the flux reaction temperatures is 100° C and 120° C. The soldering temperature of some SnIn₅₂ soldering alloys is known to be 118° C and the melting temperature of some SnBi₅₈ soldering alloys is known to be 138° C), and having viscosity that flows at a normal temperature and that deposits in layers on a base material (abstract); and the solder particles are granular agents (paragraph 0018) that precipitate in the liquid substance towards the base material (inherent characteristic of a tin powder suspended in an organic liquid under the influence of gravity), having a mixing ratio and a particle diameter to be uniformly dispersible within the liquid substance (0117, inherent characteristic of a tin solder powder, since a non-uniform dispersion would cause unacceptable amounts of failures in the electronic components due to non-uniform bump beads).

Regarding claim 3, Saito teaches the solder particle diameter less than or equal to 35um. (Paragraph 0111, where spherical particles of diameters of 20 to 60 microns were taught, specifically teaching 20 micron particles).

Regarding claim **4**, Saito contemplates that the solder particle with an oxide film created without additional treatment, since Saito provides for an optional antioxidant. (Paragraph 0115).

Regarding claim **5**, **6**, and **7**, Saito teaches the use of a liquid flux composed of fatty acid, of which at least some would be "free fatty acids" since they are not attached to other molecules. (Paragraph 0041). By the applicant's admission, free fatty acids accelerates the soldering between the solder particles and the base material and accelerates coalescence of the solder particles with the solder coating formed on the base material while suppresses coalescence of the solder particles by the reaction product thereof. (Specification page 16, line 19 to page 17, line 1).

Regarding **8**, **10**, and **12**, Saito teaches the use of a liquid flux composed of fatty acid ester (paragraph 0037), and acid numbers from 2.1 (Table 1) through 15.3 (Table 4).

Regarding claims **9** and **11**, Saito contemplates a liquid flux comprised of a neopentyl polyol ester. (Paragraph 0037-0040).

Regarding claim **13**, Saito teaches a deposition step for depositing on a base material solder composition and a reflow step for heating the solder composition and forming bumps made up of solder particles on the base material. (Paragraph 0117)

Regarding claim **14**, Saito teaches uniformly dispersing the solder particles in the liquid substance by stirring the solder Composition in a pre-stage of the deposition step. (Paragraph 0109).

Regarding claim **15** and **16**, Saito teaches flowing the flux component or dipping the substrate into the flux composition (paragraph 0117), and spin coating is a well

known method of flowing a chemicals across a substrate to achieve a uniform thickness of chemical over the substrate in the semiconductor and electronic arts.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. The factual inquiries set forth in Graham v. John Deere Co., 383 U.S. 1 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Saito et al (PCT/JP02/09946, with specific references made through the national stage publication of US 2004/02509129) in view of Ono et al (US 2003/0047034). Saito teaches a solder flux composition (abstract) for use in electronic components (paragraph 0002) and a method of soldering using the same, wherein the liquid substance contains a flux component (abstract) and a tin alloy (paragraph 0111, where the solder powder may be of any kind, including Sn/Pb, Sn/Ag, Sn/Ag/Cu, Sn/Cu, Sn/Zn, Sn/Zn/Bi, Sn/Bi, or Sn/In, which is similar to the solder powder composition described in the Specification, page 9, line 10), where the flux reaction temperature is close to the melting point of the solder particle (Table 1, where the flux reaction temperatures is 100° C and 120° C. The soldering temperature of some SnIn₅₂ soldering alloys is known to be 118° C and the melting temperature of some SnBi₅₈ soldering alloys is known to be 138° C), and having viscosity that flows at a normal temperature and that deposits in layers on a base material (abstract); and the solder particles are granular agents (paragraph 0018) that precipitate in the liquid substance towards the base material (inherent characteristic of a tin powder suspended in an organic liquid under the influence of gravity), having a mixing ratio and a particle diameter to be uniformly dispersible within the liquid substance (0117, inherent characteristic of a tin solder powder, since a non-uniform dispersion would cause unacceptable amounts of failures in the electronic components due to non-uniform bump beads). Saito does not teach teaches a mixing ratio of the solder particles is less than or equal to 30wt%.

Ono teaches a solder paste (paragraph 0015) composed of fine tin alloy particles (paragraph 0042) dispersed in an organic compound (paragraph 0043), where a ratio is used of 0.1-100 grams of solder metal to 100 grams of dispersing medium, which includes 0.1 grams of

solder metal to 100 grams of dispersing medium (cf the claimed mixing ratio of the solder particles equal to or less than 30wt%).

As a result, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the ratio of 0.1 grams of solder metal to 100 grams of dispersing medium in the solder composition of Saito, since Ono teaches fine tin particles can be dispersed in low concentrations in the dispersing medium and be useful as a soldering paste, as the lower concentrations of tin alloy is an alternative to the higher concentration of tin alloy soldering paste.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to YOSHITOSHI TAKEUCHI whose telephone number is (571) 270-5828. The examiner can normally be reached on Monday-Thursday 9:30-3:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jennifer McNeil can be reached on (571) 272-1540. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Yoshitoshi Takeuchi/

/Jennifer McNeil/
Supervisory Patent Examiner, Art Unit 4162